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CENTRAL INTELLIGENCE AGENCY

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COUNTRY USSR/Soviet Bloc

REPORT

SUBJECT Survey of Nickel Production in the Soviet Bloc

DATE DISTR. 13 October 1958

25X1

NO. PAGES 1

REQUIREMENT NO. RD

DATE OF INFO.

REFERENCES

PLACE & DATE ACQ.

25X1

SOURCE EVALUATIONS ARE DEFINITIVE. APPRAISAL OF CONTENT IS TENTATIVE.

1. A 12-page survey of nickel production in the Soviet Bloc including a map of ore deposits in the Soviet Bloc

2. This report is part of a series of economic surveys on the production of strategic raw materials and contains information on nickel production, ore deposits, and supply problems in the Soviet Bloc 25X1
The survey includes statistics through 1957 and estimates for 1958. It 25X1
is undocumented.

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STRATEGIC RAW MATERIALS

9. Steel Alloying Metals.

b. Nickel.

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1. Properties and Uses.

1.1. Properties

Nickel is a tough and hard metal highly resistant to corrosion, wear, shock and high temperatures. It is second in abundance among the heavy metals. With regard to prevalence it ranges as number 22 among the elements. Its melting point is 1452 °C. Nickel is ductile, malleable and weldable, it can be rolled hot or cold, but not suitable for casting. It is somewhat magnetic, much less so than iron, however. Its electric conductivity is 4 to 5 times less than that of copper. Nickel is very suitable for electroplating.

1.2. Uses

A little less than half of world nickel consumption goes into iron and steel alloys. In wartime this proportion, however, is considerably increased. 25X1

Among the alloy metals nickel is the one which has the greatest variety of applications. To-day more than 3ooo different alloys are registered with nickel contents varying from 99.7 to 2 per cent. Besides with iron, nickel is alloyed with molybdenum, cobalt, chromium, titanium and others.

Low-grade nickel-steel alloys contain from o.5 to o.7 per cent of nickel, high-grade nickel-steel contains from 7 to 35 per cent of nickel. The former type of alloys is used in motor-cars, aeroplanes, railway rolling stock, axels etc. High-grade nickel-steel is applied in ship-building, chemical equipment, precision instruments, armour, ammunition (e.g. shell cases), jet engines, pipes, cannon parts exposed to shock and hard wear. Nickel alloys are extensively used in modern electric industry.

Many coins are made of nickel or nickel alloys.

In various applications chromium, manganese, molybdenum and cadmium may be substituted for nickel.

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3.2. Deposits in the Soviet Bloc

3.2.1. The Soviet Union

The Soviet Union has nickel sulfide deposits at Pechenga (formerly Petsamo), at Monchegorsk on the Kola peninsula and in the Norilsk area. 25 - 30 per cent. of the Soviet nickel reserves are thought to be contained in the Pechenga and Monchegorsk deposits. Besides nickel the ore contains copper and cobalt. The nickel-copper ratio is estimated at 2.0 - 2.6:1, the nickel-cobalt ratio at 80 - 67:1. The nickel content of the Pechenga ore is put at 1 - 3.5 per cent. and the metal reserves at 230 - 240.000 tons. The nickel content of the Monchegorsk ore is estimated at about 1.8 per cent., which represents about 180.000 tons of nickel.

[redacted] the nickel production of the Kola Peninsula in 1956 was 4.6 times as large as before the war. It is not known whether this figure referred to the production of ore or to the refined nickel output.

According to a western estimate, 15.000 tons of nickel were produced in 1957 from Pechenga ore. In 1960 this production is calculated to reach c. 29.000 tons. Should this forecast come true, Pechenga must be considered the most important Soviet nickel area.

The Norilsk deposits are thought to be the largest in the Soviet Union. In 1937 the nickel reserves were estimated at 500.000 tons, the copper and platinum re-

serves at 720.000 and 370 tons respectively. Large quantities of cobalt are also located there.

The Soviet Union is thought to have large nickel reserves in the nickel silicate deposits in the Southern and Central Urals. The principal deposits are Khalilovo, Akkerman and Aidyrla in the Southern Urals and Buranovo-Selekhta in north-east Kazakhstan. The Uralsk nickel ores contain from 1 to 7 per cent. of nickel and are found at depths down to 300 metres. Many of the deposits are being mined by the open cast method. The nickel ores consists mainly of silicates very like the New Caledonian deposits. Nickel sulfides like those of the Sudbury district do not occur. Cobalt is found in the ores. The cobalt-nickel ratio is 1:20.

The Khalilovo deposit was estimated at 240.000 tons of nickel in 1933, a figure which is now thought to have been put too low. The reserves in the other south Uralsk deposits are not known. However, the Akkerman are thought to be almost exhausted now. The Buranovo-Shelekhta(Aktyubinsk) deposits are probably smaller than the Khalilovo deposits. In 1933 the reserves were put at 70 - 100.000 tons of nickel. The nickel percentage increased with the depth from 0.72 per cent. to 1.5 per cent. at a depth of 28 metres. The deposits in the Central Urals, such as Ufalei are older and often with a high nickel content (4 per cent.) They are thought to be nearly exhausted.

In the Soviet Union new nickel discoveries are expected, especially within the western part, south of Norilsk, of the East Sibirian plateau. The Sixth Five-year Plan counts on a 30 - 35 per cent. increase of known nickel reserves.

3.2.2. The Satellite Countries

The Soviet Bloc is not thought to possess large nickel reserves outside the Soviet Union. In East Germany the reserves are put at 66.000 tons of contained metal. Small quantities of nickel and other metals e.g. cobalt are found in the ore mined to obtain its uranium content. The size of the North Korean nickel deposits are not known. In 1944 production here reached a peak of 57.000 tons of ore, from which was recovered 443 tons of pure metal.

Nickel and copper occur in the Albanian iron ore. The quantities are not known. The nickel content of the ore is recovered at the Vitkovice iron works at Ostrava in Czechoslovakia.

Poland has a small production of nickel ore (in 1956 c. 210 tons of nicekl content). 25X1

3.2.3. The Latest Discoveries

An uncorroborated report says that a Russian work team has for some time been examining a nickel find about 20 kilometres from the Jarfjordsfjeld in South Varanger. The deposit may be a branch of the deposit found during the inter-war period at Svanvik in Finland.

deposits of nickel silicate ore have been found in West Kazakhstan and that this deposit has already been thoroughly examined. 25X1

In East Germany a nickel deposit was discovered in 1952 at Kuhschnappel. East Germany is hoping to meet its home consumption with nickel from this deposit.

In Bulgaria nickel ore was found in 1955. Investigation is still in progress to scertain whether remunerative exploitation is possible.

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Nickel plants in the Soviet Bloc.

Soviet:	(Estimated annual capacity)
Orsk	lo.ooo tons.
Monchegorsk	lo.ooo -
Pechenga	lo.ooo -
Norilsk	5 - lo.ooo -
Ufalei	.....

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Production figures from Kazakhstan, Alma Ata, Karaganda, Semipalateusk, Leninogorsk and Zakomemk in the Chita area are not available.

The Orsk nickel plant works on ore from the Southern Urals.

The Monchegorsk plant started production in 1938. During the war it was bombed. Its production in 1953 is estimated at 5ooo tons, at lo.ooo tons.

The Pechenga plant was enlarged during the war by the Germans who had planned an annual production of lo.ooo tons of nickel and 6.ooo tons of copper. A peak annual output of 9.ooo tons was reached in 1943. To-day there are many signs that an extension is taking place or has just been completed so that all nickel extracted within that area can now be refined locally. The capacity will probably be substantially above lo.ooo annually by 196o.

Norilsk This plant was built during World War II near Igarka. This plant is thought by some to be the largest in the USSR.

As a by-product from nickel production, 6oo tons of cobalt are produced annually in the Soviet Union.

East Germany:

At Hüttenwerke Aue are produced electrolytic nickel and nickel anodes. Production at Hüttenwerke Oberschlemma is slight. At the St. Egidien Nickel Works nickel is produced in an experimental plant. The Substitution of a nickel smelter for the experimental plant is being planned. The production of this plant is to meet East Germany's consumption. The ore comes from a near-by mine. In 1956 the output of the plant was 2oo tons. In 1958 3oo tons of nickel are to be produced according to the plans and it is hoped that production may be increased to 1.ooo tons by 196o. The finished nickel has a purity of 99.6 per cent.

Czechoslovakia:

The Vitkovice Iron Works at Ostrava. The raw material is Albanian ore. The nickel extraction plant, which it took a year to build, is probably of recent date.

5. Supply Problems

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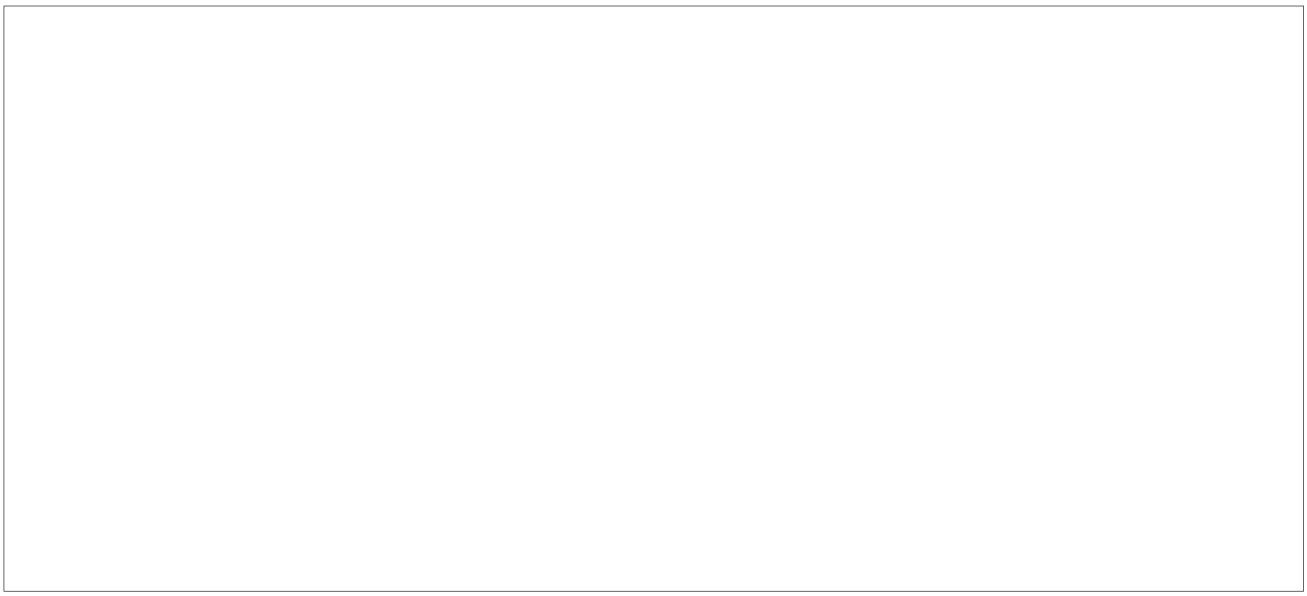

5.2. Problems of the Soviet Bloc

In the years 1936 - 38 the USSR imported 44.5oo tons of nickel and during the war 22.3oo tons. Then all nickel export to the USSR came to an end. During the war Russian concumption was considerably reduced as large sections of the nickel industry were put out of function. Consequently Shimkin's assertion, in his "Minerals, a Key to Soviet Power", that Soviet nickel stocks, put in 194o at lo.ooo tons, by the end of the war had reached a total of 25.ooo tons cannot be refuted out of hand.

It is claimed that the USSR during World War II saved about 3.ooo tons of nickel a year by using chromium steel in projectiles. Soviet Russia, which has a substantial production of chromium and manganese, probably still uses these metals in a number of alloys in which western countries use nickel. Nevertheless nicke. has hitherto been considered one of the metals most critical to Russia.

It appears from several journals that Russian nickel production does not, mainly for administrative reasons, reach the plan targets and that the Soviet steel industry suffers from a considerable shortage of nickel which causes some difficult Technical periodicals mention several bottlenecks and recommend the steel industry to use other types of stainless steel, especially high-grade chromium steel instead of nickel-chromium steel, which ought to be produced only for purposes where the use of other types of steel is out of the question.

Since the war, Soviet nickel production has increased very much. It is thought to be,at present, about 5o.ooo tons annually (1956). The estimate of western experts is that Soviet production plans for 196o envisage a nickel production of 6o - 85.ooo tons.

Although nickel is a critical metal in the USSR (and this may be only a tempora or periodical phenomenon) it must in view of the great production increase, be assumed that the metallurgical employment of nickel has begun to expand.

the Soviet Union will increase its production of nickel steel alloys seventeenfold.

It has more than once been suggested in western quarters that a Soviet offer of nickel on the world morket would cause no surprise. Such offers, however, are not known of. But it must be assumed that the other Communist countries have their nickel consumption supplied by import from the USSR. Thus Poland in 1957 imported 7oo tons of nickel from Russia. East Germany's nickel import was in 1956 and 1957 1.47o and 1.5oo tons respectively. In 1958, 1.7oo tons are to be imported. This import probably all originates from Russia. Russia is also known to export nickel to Yugoslavia.

To sum up we may say that in wartime the West would seem to be better off as regards nickel supplies than the Soviet Bloc. The great part of free world nickel comes from less vulnerable areas, the reserves seem plentiful and the production capacity is great. The important Russian deposits in the Kola peninsula, on the other hand, are in a fairly exposed situation and could be inflicted heavy damages on. It is doubtful whether the Soviet Bloc would be able to meet a steeply increased wartime demand out of the deposits known at present.

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